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THE UNIVERSITY OF ALBERTA

APTITUDE, INTELLECT AND SUCCESS  
IN BUSINESS ADMINISTRATION

BY



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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies for acceptance, a thesis entitled "APTITUDE, INTELLECT AND SUCCESS IN BUSINESS ADMINISTRATION" submitted by Frederick Antoine Dubray in partial fulfilment of the requirements for the degree of Master of Education.



## ABSTRACT

The purpose of this study has been to examine the possible use of the Differential Aptitude Tests, Lorge-Thorndike Intelligence Tests and demographic variables to distinguish successful from unsuccessful two year Business Administration students at the Northern Alberta Institute of Technology.

164 students of the 1968-1970 class of Business Administration students were designated as graduates (granted diploma), persisters (some course failures) and drop-outs (early terminators). Differential Aptitude Test and Lorge-Thorndike Intelligence Test scores were analysed for each of the three nominal groupings. Demographic variables were also considered.

Graduates, persisters and drop-outs did yield different Differential Aptitude Test profiles. Verbal Reasoning and the combined Verbal Reasoning-Numerical Ability scores were higher for graduates than for persisters. Graduates scored higher than drop-outs on certain sub-tests of the Differential Aptitude Tests: Verbal Reasoning, Numerical Ability, Verbal Reasoning plus Numerical Ability, Abstract Reasoning, Space Relations, Spelling and Grammar. The Verbal Reasoning plus Numerical Ability scores were higher for persisters than for drop-outs. All three nominal groups were distinguishable on the basis on their Verbal Reasoning plus Numerical Ability scores.





The Graduate group scored higher than drop-outs on the Verbal and Nonverbal Batteries of the Lorge-Thorndike Intelligence Tests. The Verbal battery scores were higher for persisters than for drop-outs. No other noticeable differences between the three groups were observed.

Information concerning demographic variables of the three nominal groupings was inconclusive.

The findings of the study were interpreted to mean that the Differential Aptitude Tests and Lorge-Thorndike Intelligence Tests may be used to differentiate successful from unsuccessful Business Administration students at the Northern Alberta Institute of Technology.





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## CHAPTER I

### INTRODUCTION

In past years a large number of students, sixteen years of age and over who have completed the twelfth grade in high school across the Province of Alberta and other Canadian provinces, applied for enrollment in the two year Business Administration program at the Northern Alberta Institute of Technology (N.A.I.T.). In a six year period (1963-1968) 643 students were admitted to this program: only 247 graduated. Of those students admitted, 396 failed to complete the Business Administration program. This would appear to be an excessive waste of time and money for both the student and the school.

Two criteria have been used for selecting students in Business Administration: the completion of a high school diploma or equivalent standing (based on the standards set down by the Department of Education in the Province of Alberta) and the priority of the individual application (applicants were considered according to the date their application was received). When the prescribed number of vacancies for first year students had been filled all other applicants were given three options of making a second choice of program, placing their application on "hold" or withdrawing their application. This procedure for selecting students seemed to operate on the principle





of "first come, first served", rather than viewing the prospective student's total abilities, interests and inclinations.

The above practice of selecting students appears to have certain weaknesses. Firstly, many of the students who were originally selected for the Business Administration program did not appear for registration. Since there is no formal recall procedure, this would appear rather unfair for those prospective students who took the option of making a second choice or the option of application withdrawal.

Secondly, using the high school diploma as a measure of academic achievement would appear to have an inherent weakness. High schools across Alberta offer a wide variety of courses all of which are credited towards a high school diploma. There is very little standardization of course work except that a student must complete a total of 100 credits and the following: at least 10 credits in social studies, at least 2 credits in physical education, minimum of 5 credits in science, minimum of 5 credits in mathematics and credit in two Grade XII subjects in addition to English 30 or 36 or 33. It would appear that the problem of assessing students, academically, on the basis of a high school diploma is a very difficult one.

Millett (1968, pp. 52-65) pointed out that a college admissions officer faced with a selective admissions policy is expected to exercise judgment and to accept only those



students who best fit the program or programs of the institution he serves. It does appear that N.A.I.T. practices selective admissions, but may be failing to select the most suitable candidates in view of the 60% pupil failure rate in Business Administration.

In 1968 the student counselling department at N.A.I.T. instituted a compulsory group testing program for all students entering training programs. The tests which are administered are the Differential Aptitude Tests (D.A.T.) and the Lorge-Thorndike Intelligence Tests (Lorge-Thorndike Test). The raw scores obtained from the D.A.T. are converted into percentile ranks and the intelligence quotients are determined from the table of norms in the Lorge-Thorndike Test manual. To some extent, these results gave the N.A.I.T. counsellor information, helpful in giving guidance to students with academic problems and those seeking admission to the various programs offered at the Technical Institute.

However, test interpretations by N.A.I.T. counsellors have been highly subjective. Investigations soundly based on statistical procedures have not resolved the following questions: Are there certain sub-tests of the D.A.T. which predict academic success or failure of the Institute student? Can the Verbal and Nonverbal scores on the Lorge-Thorndike Test determine a student's potential capacity to achieve academically in the various programs offered at the Institute? Do certain demographic variables



influence an individual's scores on the above tests?

These are only a few of the basic questions that need answers before test scores can be more meaningfully used. N.A.I.T. counsellors seem to lack much of the information which indeed could augment their use of test scores.

A framework in which test scores may be appropriately used is offered by Goldman (1961, pp. 162-168) as he mentions that counsellors should use tests which have available normative data comparable to the individual's current characteristics (age, education, etc.) or to the characteristics of the group he is considering joining or competing with (carpenters, clerks, etc.). He further suggests that in using norms one must not assume that in comparison with a norm group, the higher the score, the better. This conclusion cannot be justified unless more information is available than that contained in the table of norms.

In the past few decades our society has witnessed a growing awareness of the need for conserving human resources. There is a continuing concern over the waste of human talent and it is apparent that the seriousness of this situation warrants investigation into possible avenues of action. One facet of this problem is the large number of students (approximately sixty percent) who failed to complete the Business Administration program at N.A.I.T. This figure represents a serious loss of trained manpower for society and a waste of time and money for the





individuals concerned. For example, the approximate cost of training the Business Administration student for one year is one thousand dollars. This amount of money times the number of drop outs (396 students from 1963-1968) over a two year period represents a large economic loss.

The present study will investigate the possibility of identifying predictor variables which could be of aid in predicting academic success or failure for those students contemplating entering the Business Administration program. To do this, evaluations of the D.A.T. and Lorge-Thorndike Test will be made to see if certain factors contained within each of these instruments may be used to identify successful and unsuccessful students. A further analyses of demographic variables pertaining to this grouping of students will be undertaken.

Should any significant findings emerge from this study then certain suggestions could be introduced to the Admissions Office at N.A.I.T. for use in the selection procedure. These findings may also assist the counselling staff in performing their function of vocational and educational guidance.



## CHAPTER II

### RELATED LITERATURE

#### Introduction

In 1890 James Cattell published an article using the term "mental tests", which was this term's first use in psychological literature. Cattell was less interested in the use of mental measurement to establish general laws of behavior, preferring their employment in the study of individual differences. By means of his tests he measured the abilities of students at two universities, seeking to predict academic performance (Borow, 1964, p. 48).

With increasing tempo since that beginning much attention has been focused on the use of standardized tests in school systems. Much of this interest stems from the growing competition for college admission and the widespread concern for the college drop-out. With increments in prosperity, middle-class values have spread to an even greater proportion of the members of our society. Higher education now assumes an important position in this rather ubiquitous middle class system of values. Moreover, failure to either enter college or complete college is seen as a waste of valuable manpower (Goslin, 1966, pp. 45-54).

Concern with the prediction of academic performance has caused many educational institutions to turn to selec-





tivity in admissions (Lavin, 1965, pp. 11-12). It is apparent that the use of objective selection procedures, such as appropriate tests, should serve to reduce the operation of bias and discrimination against individuals for irrelevant reasons. The prediction process requires far more empirical data than are now available. Efforts should certainly be made to gather such data (Anastasi, 1967, pp. 135-152).

### The D.A.T. and Academic Success

The D.A.T., has been studied persistently by its authors and by others, such that much data have been accumulated concerning its predictive validity. However, the predictive value of the D.A.T. varies considerably from one situation to another making local validation studies necessary (Super, 1957, p. 17). The validity of this statement is made most evident in the following studies.

Myers (1958, p. 3218) compared the D.A.T. scores of successful students in Dental Hygiene, Secretarial Technology, Electrical Technology, Mechanical Technology and Retail Distribution. He further compared the D.A.T. scores of successful and unsuccessful students in these five academic programs. He found that all programs were significantly different at the .01 level of confidence with the exception of Electrical and Mechanical Technology. The same statistical procedure revealed that successful students in each of the five areas of specialization were



significantly different from unsuccessful students in the same specialization on the basis of their aptitude test scores. This finding points to the value of a more substantial evaluation of the D.A.T. in the N.A.I.T. context.

Using a longitudinal design with a sample of 221 students, Harris and Dole (1958, pp. 128-132) studied the applicability of the D.A.T. as a predictor of academic success at the University of Hawaii. With the exception of the Spelling sub-test, all the sub-tests were significantly related to college success and the first year grades. The Verbal Reasoning and Language Usage II sub-tests were the best predictors of first year grades.

Vineyard (1958, pp. 413-416), using two groups consisting of 164 students, related D.A.T. scores obtained in high school with later academic success in college. He found that the Verbal Reasoning and Numerical Ability sub-tests were the best predictors of college success while all the D.A.T. sub-tests appeared to have longitudinal predictive value.

A few years later Ewald (1961, p. 800) also investigated the relationship between D.A.T. scores obtained at the high school level and later academic success at college. The results of his study indicated that the Verbal Reasoning and Numerical Ability sub-tests were better predictors of college success than were the other sub-tests. The Clerical Speed and Accuracy sub-test was found to be a poor predictor of success in business education while



the Mechanical Reasoning sub-test was found to be a poor predictor of success in vocational education. A combination of the Numerical Ability and Spelling sub-tests yielded a Multiple R of .586 which was a slightly better predictor of freshman college success than any other single sub-test score of the D.A.T.

Gray (1965, pp. 352-353) used four sub-tests of the D.A.T. for screening potential academic success. The Verbal Reasoning, Abstract Reasoning and Language Usage sub-tests were administered to two classes of 69 enlisted men at the N.C.O. Academy, Fort Bliss, Texas. The Verbal Reasoning sub-test was administered to a third class of 31 enlisted men. The analysis of group differences between Passing and Borderline-Failing students (of the three groups) revealed significant differences of test scores with the exception of the Spelling sub-test for one group. The Verbal Reasoning scores were the most discriminating criterion.

In an orientation testing program at the Birmingham Southern College, Elton and Morris (1956, pp. 139-143) used the D.A.T., American Council on Education Psychological Examination for College Freshmen (A.C.E.), and the English Co-op Mechanics of Expression to test 153 freshmen. Correlations between these tests and the first quarter grades were determined. The highest correlation found between grades and scores on the A.C.E. Psychological Examinations or the English Co-op Mechanics of Expression





was not significantly different from the highest correlation found between grades and test scores on D.A.T. One conclusion of the study indicated that the D.A.T. was valuable in predicting academic success of students at this college. This latter finding, again suggests practicality of examining D.A.T. scores of N.A.I.T. students in relation to program success.

Fischer (1957) studied the relationship between aptitude test scores and success in a Business Administration program. Scores on the A.C.E. Psychological Examination and the Space Relations sub-test of the D.A.T. were correlated with successful graduation from college. The A.C.E. Psychological Examination appeared to be a valid predictor of college success while the Space Relations sub-test did not afford significant predictive results.

Using the scores of over 600 engineering freshmen at the Purdue University, Wood and Lebold (1968, pp. 1223-1227) did a cross-validation study of four sub-tests of the D.A.T. (Clerical Speed and Accuracy, Mechanical Reasoning, Abstract Reasoning and Space Relations), High School Rank and the College Entrance Examination Board Scholastic Aptitude Test (Verbal and Mathematics tests) in the prediction of first semester academic performance and grades in several engineering courses. The optimal predictors were as follows: the Space Relations sub-test, the Mathematics test and High School Rank. The Mechanical Reasoning sub-test was found to be a less valuable pre-



dictor of graphic arts grades, but relevant.

In an earlier study Berdie (1951, pp. 114-123), using a similar approach (as in the above study) to predict academic success of engineering students found that the D.A.T. with the exception of the Numerical Ability sub-test did not contribute significantly.

Wurfel (1969) gathered information that could be used as a partial basis for predicting a student's relative success in the three year Electronics program offered at N.A.I.T. One question his study attempted to answer involved how well each of the sub-tests of the D.A.T. predict academic success in this training program. The results indicated that the Numerical Ability sub-test has some predictive power while the remaining sub-tests were of little value as predictors of success in the Electronics program.

#### The Lorge-Thorndike Test and Academic Success

Checkley (1967), using 93 Business Administration students at N.A.I.T., investigated the use of scores on the Lorge-Thorndike Test, scores on the D.A.T. and Grade XII high school average in predicting academic success in first quarter examinations. The findings of this study indicate that the Numerical Ability sub-test, Verbal battery and Grade XII average were all significant predictors of academic success in first quarter examinations.

Price (1967), using 105 year "A" Technology students



at N.A.I.T., studied the use of the D.A.T. and Lorge-Thorndike Test as predictors of academic success in first quarter examinations. He concluded that a combination of the Numerical Ability, Space Relations and Clerical Speed and Accuracy scores of the D.A.T. did have predictive power in as far as the first quarter student average was concerned.

Villagonzalo (1969), using a sample of 868 students, investigated whether a combination of nineteen predictor variables could differentiate between nine training groups of graduates from N.A.I.T. For each variable a one-way analysis of variance was calculated to determine the differences between group means. All differences were found to be significant at the .013 level. One further analysis of 12 predictors (8 D.A.T. sub-tests, the Verbal and Nonverbal batteries of the Lorge-Thorndike Test and high school averages in Grades X and XI) proved to be effective in identifying graduates of 8 training groups. As a whole, the results showed that the 19 predictor variables could possibly be used in predicting training outcomes of graduates at N.A.I.T. with acceptable results.

Mancott (1968, pp. 945-146), using 30 Medical Laboratory Technology students, investigated the validity of the Lorge-Thorndike Test and High School average in the prediction of achievement (final grades) in a first semester college chemistry course. The correlation of predictor variables to criterion were as follows: high school average





.552, Lorge-Thorndike Verbal battery .552 and Lorge-Thorndike Nonverbal battery .616. All three correlations were significant at the .01 level. There is reason therefore to explore the value of the Lorge-Thorndike Test for the counsellor and student at N.A.I.T.

### The Demographic Variables and Academic Success

Literature relevant to sex, marital status and place of residence in connection with success in post-secondary programs appears quite meager.

Seashore (1962, pp. 261-270) attempted to explain and support with empirical data that academic grades of women in high school and college are better predicted from aptitude tests than are academic grades of men. At the high school level he used the sub-tests of the D.A.T. to predict academic success in course work. At the college level he used the College Qualification Tests to predict the grade point averages. Correlation between aptitude test scores and grades for women were more pronounced in college than in high school. The results also indicated that academic grades of women in high school and college are better predicted from aptitude test scores than are academic grades of men.

Bennett, Seashore and Wesman (1966) make it clear in their discussion of norms that males as opposed to females score differently on the D.A.T. They mention that both small and sizable ability differences have been found.



A case which clearly demonstrates sex differences is in the use of the Mechanical Reasoning sub-test where females tend to score lower than males.

Mohandessi and Runkel (1958, pp. 47-51) investigated the relationship of academic aptitude and community size. Using the total score of the Verbal Reasoning and Abstract Reasoning sub-tests of the D.A.T. they found that the mean score made by students in rural schools was significantly lower than students from schools in an urban setting.

### Summary

In the previous discussion, it is apparent that the D.A.T. has proven to be effective in predicting educational success. The predictive value of the D.A.T. appears however, to vary according to the situation and group with which it is being used. For this reason, the value of a more substantial evaluation of the D.A.T. in the N.A.I.T. context is essential.

Using the Lorge-Thorndike Test to predict academic success at the post-secondary level, while not as clearly useful as the findings of the D.A.T., does appear appropriate. Thus, the Lorge-Thorndike, should similarly be evaluated as a predictor of success.

Information concerning demographic variables in the prediction of academic success at the post-secondary level was limited. Nonetheless, since some relationships were substantiated, it appears relevant to monitor such data



as is readily available.

## HYPOTHESES

Based on the related literature the following hypotheses were formulated with N.A.I.T. Business Administration students of the last two years, used as the intended sample. Further, the hypotheses are operationally stated to reflect division of the sample into three groups: Firstly, graduates of the Business Administration program, who passed without any failures, are hereafter termed "Graduates"; secondly, those students with modest single or partial failures at the end of the training program are termed "Persisters"; thirdly, those students who terminated during the program are called "Drop-outs".

### Hypothesis 1

Graduates as opposed to persisters will yield different D.A.T. profiles.

### Hypothesis 2

Graduates as opposed to drop-outs will yield different D.A.T. profiles.

### Hypothesis 3

Persisters as opposed to drop-outs will not yield different D.A.T. profiles.



Hypothesis 4

Graduates will obtain higher scores on the Lorge-Thorndike Test than will persisters.

Hypothesis 5

Graduates will obtain higher scores on the Lorge-Thorndike Test than will drop-outs.

Hypothesis 6

Persisters will not obtain higher scores on the Lorge-Thorndike Test than will drop-outs.

Hypothesis 7

Graduates, persisters and drop-outs will demonstrate differences in sex, marital status and place of residence.





## CHAPTER III

### PROCEDURE AND DESIGN

The purpose of this study is to investigate whether aptitudinal, intellectual and demographic variables can differentiate the successful from the unsuccessful Business Administration students in a two year training program at N.A.I.T.

#### The Samples

164 students from the 1968-1970 class of the Business Administration program at N.A.I.T. were divided into three groups and designated as follows:

- (1) 37 Graduates (students who received a N.A.I.T. diploma).
- (2) 25 Persisters (students who completed the entire program but did not receive a N.A.I.T. diploma because of one or more course failures).
- (3) 102 Drop-outs (students who terminated before completing the entire program).

17 students from the above class did not write the D.A.T. and Lorge-Thorndike Test, therefore, they were not included in the study samples.



## INSTRUMENTS

### The Differential Aptitude Tests

The D.A.T. is an ambitious instrument. Its statistical data on standardization and on analysis of later studies are exceptionally thorough and comprehensive. Designed for grades 8 through 12, it is also suitable for unselected adults (Freeman, 1963, pp. 416-418).

The battery contains the following eight sub-tests:

- (1) Verbal Reasoning. Verbal analogies are used to measure ability with more or less complex verbal concepts and relationships.
- (2) Numerical Ability. Numerical relationships and facility with number concepts are tested.
- (3) Abstract Reasoning. Ability to do problems dealing with abstract patterns.
- (4) Clerical Speed and Accuracy. Speed and accuracy of responses to letter and number combinations are measured.
- (5) Mechanical Reasoning. Mechanical comprehension is tested by presenting a series of pictorial situations involving mechanical and scientific principles.
- (6) Space Relations. Ability in spatial visualization is tested by presenting two-dimensional geometric figures.
- (7) Language Usage. Part I is a spelling test.
- (8) Language Usage. The grammar section attempts to measure the students ability to distinguish between good and bad grammar, punctuation and word usage.

The amount of validity data available on the D.A.T. is overwhelming, including several thousand validity coefficients. The validity has been studied mainly in three



ways: prediction of course grades, of achievement-test results and of vocational and educational success. Many of the coefficients are high even with intervals as long as three years between test and criterion data (Anastasi, 1961, p. 350).

Reliability was determined by the split-half method for all tests except the Clerical Speed and Accuracy test: the reliability of this test was determined by the use of alternate forms. The reliabilities of the tests, both for males and females from grade 8 through 12, range from .85 to .96 for all tests except the Mechanical Reasoning test. The reliability for men on the Mechanical Reasoning test is sufficiently high, with a mean coefficient of .88, while the reliability for women is .75 (Bennett, Seashore and Wesman, 1966).

Nunnally (1964, p. 239) points out that the D.A.T. is a model of careful test design, practicality, thoroughness of research and frankness of reporting. In the present investigation Form L (1963) was utilized.

### The Lorge-Thorndike Intelligence Test

The Lorge-Thorndike Test can be used to examine five levels, extending from kindergarten through grade 12. The authors of these scales state that these are tests of abstract intelligence which they define as the ability to work with ideas and the relationships among ideas. The first two levels of these tests use only nonverbal test





items, while the higher levels include both Verbal and Nonverbal sub-tests, from which a verbal I.Q. and a non-verbal I.Q. can be obtained. The Verbal series of sub-tests include word knowledge, sentence completion, verbal classification, verbal analogies and arithmetical reasoning. The Nonverbal series is entirely pictorial, diagrammatic or numerical (Freeman, 1963, p. 387).

Procedures used in the construction and validation of this series of intelligence tests have been so superior as to have promoted wide usage and acceptance for educational applications. Thorndike and Hagen (1964, p. 573) mention that the reviewers in *Buros' mental measurements yearbooks* consider the test among the most sophisticated of the group-intelligence tests.

Two procedures used to establish the reliability of the test are alternate-forms estimates (verbal .896, non-verbal .846) and odd-even estimates (verbal .940, nonverbal .905) (Lorge-Thorndike, 1957).

Anastasi (1961, pp. 217-220) in her concluding remarks about the Lorge-Thorndike Tests points out that their main strengths result from the sound theoretical rationale underlying choice of content, the size and representativeness of the standardization sample, the high reliability of the I.Q.'s and the generally superior quality of test-construction procedures followed in developing the tests. In the present study level 5, Form B, was used.



## OTHER DATA COLLECTION PROCEDURES

### Demographic Information Collection

Every person applying for admission to N.A.I.T. must file an application form stating such information as marital status, place of residence and sex. The above demographic information was obtained from these application forms, then coded and employed in relevant hypothesis testing.

### Achievement Information Collection

Student files for the 1968-1970 Business Administration class (established by the Admissions Office at N.A.I.T.) were used to obtain the following achievement information:

- (1) The N.A.I.T. calendar stipulates that the Institute will issue a "Diploma of Applied Arts or Technology" to students who have regularly attended classes and passed all subjects of a two year program. In this study all students who were granted a N.A.I.T. diploma are called "Graduates".
- (2) In this study students are referred to as "Persisters" if they completed the entire program but did not receive a N.A.I.T. diploma because of one or more course failures.
- (3) "Drop-outs" refer to students who terminated during the two year program because of academic difficulty, lack of interest or personal problems.

The above achievement information was coded and employed in relevant hypothesis testing.



### Testing Procedure

In 1968 the N.A.I.T. counselling personnel administered both the D.A.T. and the Lorge-Thorndike Test to the 164 students used in this study. The students were given the choice of attending one of four testing sessions (April, July, August or September). Each testing session was held on two consecutive days. On the first day, testing included the Verbal Reasoning, Numerical Ability, Abstract Reasoning, Clerical Speed and Accuracy, Verbal Battery and Nonverbal Battery tests. The second day of testing consisted of administering the remaining D.A.T. sub-tests. Both tests were administered in the manner prescribed by the test manuals. All test scores (raw scores) used in this study were obtained from the N.A.I.T. Counselling Office.

### Analysis

Results from the above testing program and the demographic data, mentioned earlier, were then entered on I.B.M. cards.

The scores obtained by the persons in the various nominal groupings on the D.A.T. and Lorge-Thorndike Test were then subjected to analysis of variance. Demographic data was to be treated in the same manner but proved impractical for reasons elaborated upon in Chapter IV. Criterion significance was set at .05 but trends beyond .10 were also noted.



## CHAPTER IV

### FINDINGS AND CONCLUSIONS

#### Introduction

Can aptitudinal, intellectual and demographic variables distinguish successful from unsuccessful Business Administration students? To answer this question the following procedures are observed. Firstly, D.A.T. scores of graduates, persisters and drop-outs are analyzed. Secondly, Lorge-Thorndike Test scores of the same three nominal groupings are examined. Thirdly, the graduates, persisters and drop-outs are separated into pertinent demographic groupings. In the last category sex, marital status and place of residence are considered.

Hypotheses relevant to each of these four procedures are separately re-stated, followed by findings and conclusions appropriate to each hypothesis.

#### HYPOTHESES RELATED TO D.A.T. SCORES OF THE NOMINAL GROUPINGS

##### Hypothesis 1

Graduates as opposed to persisters will yield different D.A.T. profiles.





## Findings

The D.A.T. profiles of graduates and persisters are charted in Figure 1. The means and standard deviations of D.A.T. scores of graduates and persisters are reported in Table 1. Analyses of variance were used to calculate the differences between the means of these scores. A summary is provided in Table 2.

The graduates scored higher than persisters on two D.A.T. measures: Verbal Reasoning and the combined Verbal Reasoning-Numerical Ability scores.

## Conclusion

The first hypothesis is thus confirmed noting that graduates as opposed to persisters do yield different D.A.T. profiles.

## Hypothesis 2

Graduates as opposed to drop-outs will yield different D.A.T. profiles.

## Findings

The D.A.T. profiles of graduates and drop-outs are represented in Figure 1. The means and standard deviations of the graduate's and drop-out's D.A.T. scores are compiled in Table 1. Next, the difference between means of D.A.T. scores (reported in Table 3) are determined by using analyses of variance.



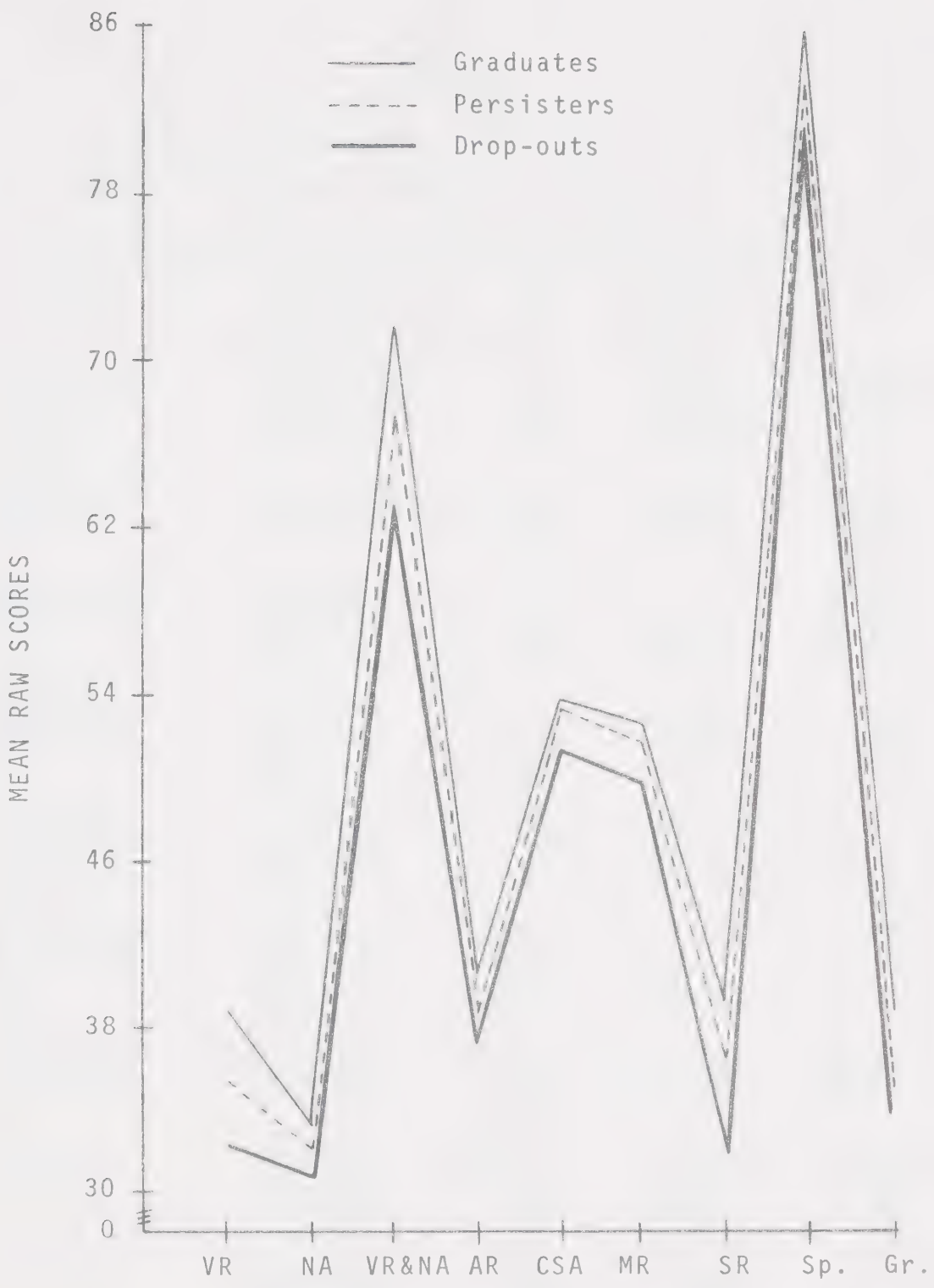


FIGURE 1

D.A.T. PROFILES OF GRADUATE,  
PERSISTERS AND DROP-OUT GROUPS



TABLE 1

THE MEANS AND STANDARD DEVIATIONS OF THE D.A.T.  
SCORES OF GRADUATE, PERSISTER AND DROP-OUT GROUPS

Sub-Test	Group	N	Mean	S D
Verbal Reasoning	Graduate	37	38.84	5.16
	Persister	25	35.36	6.87
	Drop-out	102	32.26	7.33
Numerical Ability	Graduate	37	33.08	5.49
	Persister	25	31.92	4.51
	Drop-out	102	30.75	4.93
Verbal and Numerical	Graduate	37	71.65	7.67
	Persister	25	67.28	9.51
	Drop-out	102	63.03	9.89
Abstract Reasoning	Graduate	37	40.41	4.32
	Persister	25	38.56	5.45
	Drop-out	102	37.44	5.58
Clerical Speed and Accuracy	Graduate	37	53.78	6.78
	Persister	25	53.24	8.34
	Drop-out	102	51.32	8.66
Mechanical Reasoning	Graduate	37	52.46	7.77
	Persister	25	51.76	7.14
	Drop-out	102	49.75	7.52
Space Relations	Graduate	37	39.00	10.69
	Persister	25	36.16	13.22
	Drop-out	102	31.72	11.25
Spelling	Graduate	37	85.76	9.69
	Persister	25	82.88	8.81
	Drop-out	102	81.12	12.33
Grammar	Graduate	37	38.65	10.79
	Persister	25	34.92	5.57
	Drop-out	102	34.02	6.57





TABLE 2  
SUMMARY, ANALYSES OF VARIANCE OF THE D.A.T.  
SCORES OF GRADUATE AND PERSISTER GROUPS

Sub-Test	Source	M S	df	F-ratio	P
Verbal Reasoning	Group Error	180.44 34.85	1. 60.	5.18	0.026463
Numerical Ability	Group Error	20.12 26.24	1. 60.	0.77	0.384686
Verbal and Numerical	Group Error	284.88 71.49	1. 60.	3.98	0.050463
Abstract Reasoning	Group Error	50.81 23.05	1. 60.	2.20	0.142871
Clerical Speed and Accuracy	Group Error	4.37 55.45	1. 60.	0.80	0.779757
Mechanical Reasoning	Group Error	7.25 56.60	1. 60.	0.13	0.721668
Space Relations	Group Error	120.37 138.52	1. 60.	0.87	0.354971
Spelling	Group Error	123.62 87.39	1. 60.	1.41	0.238982
Grammar	Group Error	207.44 82.27	1. 60.	2.52	0.117574



TABLE 3  
SUMMARY, ANALYSES OF VARIANCE OF THE D.A.T.  
SCORES OF GRADUATE AND DROP-OUT GROUPS

Sub-Test	Source	M S	df	F-ratio	P
Verbal Reasoning	Group Error	1173.06 46.59	1. 137.	25.18	0.000006
Numerical Ability	Group Error	146.87 25.85	1. 137.	5.68	0.018518
Verbal and Numerical	Group Error	2017.00 87.54	1. 137.	23.04	0.000008
Abstract Reasoning	Group Error	238.56 27.81	1. 137.	8.58	0.003992
Clerical Speed and Accuracy	Group Error	164.25 67.39	1. 137.	2.44	0.120801
Mechanical Reasoning	Group Error	199.94 57.51	1. 137.	3.48	0.064380
Space Relations	Group Error	1440.69 123.28	1. 137.	11.69	0.000831
Spelling	Group Error	584.25 136.84	1. 137.	4.27	0.040684
Grammar	Group Error	581.75 62.38	1. 137.	9.33	0.002717



The graduates scored higher than drop-outs on the following D.A.T. sub-tests: Verbal Reasoning, Numerical Ability, Verbal Reasoning plus Numerical Ability, Abstract Reasoning, Space Relations, Spelling and Grammar. It was further noted that by using the .10 level of significance, a trend is evident for graduates to score more highly than drop-outs on the Mechanical Reasoning sub-test.

### Conclusion

Hypothesis 2 is confirmed and it may be concluded that graduates as opposed to persisters do yield different D.A.T. profiles.

### Hypothesis 3

Persisters as opposed to drop-outs will not yield different D.A.T. profiles.

### Findings

The D.A.T. profiles of persisters and drop-outs are charted in Figure 1. Table 1 provides the means and standard deviations for the persister's and drop-out's D.A.T. scores. Analyses of variance were used to determine the differences between the means of these scores (Table 4).

The persisters scored higher on the Verbal Reasoning plus Numerical Ability combination of scores than did drop-outs. If the .10 level of significance is considered, then persisters appear to score more highly than do drop-



TABLE 4  
SUMMARY, ANALYSES OF VARIANCE OF THE D.A.T.  
SCORES OF PERSISTER AND DROP-OUT GROUPS

Sub-Test	Source	M S	df	F-ratio	P
Verbal Reasoning	Group Error	192.31 52.45	1. 125.	3.67	0.057793
Numerical Ability	Group Error	27.25 23.54	1. 125.	1.16	0.284058
Verbal and Numerical	Group Error	362.69 96.37	1. 125.	3.76	0.054631
Abstract Reasoning	Group Error	25.13 30.81	1. 125.	0.82	0.368255
Clerical Speed and Accuracy	Group Error	73.69 73.98	1. 125.	1.00	0.320186
Mechanical Reasoning	Group Error	81.50 55.42	1. 125.	1.47	0.227565
Space Relations	Group Error	396.63 135.75	1. 125.	2.92	0.089879
Spelling	Group Error	62.25 137.83	1. 125.	0.45	0.502809
Grammar	Group Error	16.25 40.78	1. 125.	0.40	0.529049





outs on both the Verbal Reasoning and Space Relations sub-tests.

### Conclusion

Hypothesis 3 must then be rejected and it is concluded that persisters as opposed to drop-outs do yield different profiles.

## HYPOTHESES RELATED TO LORGE-THORNDIKE TEST SCORES OF THE NOMINAL GROUPINGS

### Hypothesis 4

Graduates will obtain higher scores on the Lorge-Thorndike Test than will persisters.

### Findings

Table 5 reports the means and standard deviations of the Lorge-Thorndike Test scores of graduates and persisters. Analyses of variance were used to test hypothesis 4. Table 6 reports the findings.

The graduates do not score higher than persisters on either the Verbal or Nonverbal battery of the Lorge-Thorndike Test.

### Conclusion

The fourth hypothesis must be rejected and it is concluded that graduates do not obtain higher scores on the



TABLE 5

THE MEANS AND STANDARD DEVIATIONS OF THE  
LORGE-THORNDIKE TEST SCORES OF GRADUATE,  
PERSISTER AND DROP-OUT GROUPS

Sub-Test	Group	N	Mean	S D
Verbal	Graduate	37	62.95	9.14
	Persister	25	59.64	8.92
	Drop-out	102	55.15	10.33
Nonverbal	Graduate	37	52.32	8.08
	Persister	25	49.64	7.84
	Drop-out	102	46.22	9.48

TABLE 6

SUMMARY, ANALYSES OF VARIANCE OF THE LORGE-THORNDIKE  
TEST SCORES OF GRADUATE AND PERSISTER GROUPS

Sub-Test	Source	M S	df	F-ratio	P
Verbal	Group	163.00	1.	1.99	0.163342
	Error	81.96	60.		
Nonverbal	Group	107.44	1.	1.68	0.199247
	Error	63.77	60.		



Lorge-Thorndike Test than persisters.

### Hypothesis 5

Graduates will obtain higher scores on the Lorge-Thorndike Test than will drop-outs.

### Findings

The mean and standard deviations of graduate's and drop-out's Lorge-Thorndike Test scores are stated in Table 5. Next, the differences between means of these Lorge-Thorndike Test scores (Table 7) are calculated by using analyses of variance.

The Verbal battery and Nonverbal battery scores of graduates are higher than are Verbal battery and Nonverbal battery scores of drop-outs.

TABLE 7

SUMMARY, ANALYSES OF VARIANCE OF THE LORGE-THORNDIKE  
TEST SCORES OF GRADUATE AND DROP-OUT GROUPS

Sub-Test	Source	M S	df	F-ratio	P
Verbal	Group	1651.37	1.	16.41	0.000091
	Error	100.65	137.		
Nonverbal	Group	1013.12	1.	12.16	0.000663
	Error	83.34	137.		



### Conclusion

Therefore, the fifth hypothesis is confirmed and it may be concluded that graduates obtain higher scores on the Lorge-Thorndike Test than drop-outs.

### Hypothesis 6

Persisters will not obtain higher scores on the Lorge-Thorndike Test than will drop-outs.

### Findings

The persister's and drop-out's differences of mean Lorge-Thorndike Test scores were determined by using analyses of variance (Table 8). The means and standard deviations are reported in Table 5.

The persisters scored higher than drop-outs on the

TABLE 8

SUMMARY, ANALYSES OF VARIANCE OF THE LORGE-THORNDIKE  
TEST SCORES OF PERSISTER AND DROP-OUT GROUPS

Sub-Test	Source	M S	df	F-ratio	P
Verbal	Group	405.25	1.	3.99	0.047904
	Error	101.52	125.		
Nonverbal	Group	235.52	1.	2.79	0.097275
	Error	84.34	125.		





Verbal battery of the Lorge-Thorndike Test. It was noted, using the .10 level of significance, that a trend is evident for persisters to score more highly than drop-outs on the Nonverbal battery.

### Conclusion

Based on the evidence of this study, hypothesis 6 is rejected and it is concluded that persisters do obtain higher scores on the Lorge-Thorndike Test than do drop-outs.

## HYPOTHESES RELATED TO DEMOGRAPHIC VARIABLES OF THE NOMINAL GROUPINGS

### Hypothesis 7

Graduates, persisters and drop-outs will demonstrate differences in sex, marital status and place of residence.

### Conclusion

Hypothesis 7 was not tested because many of the observations were too small (as indicated in Table 9) and statistical applications to them could lead to spurious conclusions. Therefore, demographic variables pertaining to the graduates, persisters and drop-outs are inconclusive in this study.



TABLE 9  
NUMBER OF OBSERVATIONS OF DEMOGRAPHIC VARIABLES  
OF GRADUATE, PERSISTER AND DROP-OUT GROUPS

	Graduates	Persisters	Drop-Outs	Total
Females	6	4	10	20
Males	31	21	92	144
Married	8	1	6	15
Single	29	24	96	149
Rural	11	8	31	49
Urban	26	17	71	115



## SUMMARY OF CONCLUSIONS

Firstly, D.A.T. scores of graduates, persisters and drop-outs are compared and contrasted. The findings support the acceptance of hypotheses 1 and 2, but lead to the rejection of the third hypothesis. Graduates, persisters and drop-outs do yield different D.A.T. profiles. Verbal Reasoning and the combined Verbal Reasoning-Numerical Ability scores are higher for graduates than for persisters. All scores on the D.A.T. sub-test, except Clerical Speed and Accuracy and Mechanical Reasoning, are higher for graduates than drop-outs. The Verbal Reasoning plus Numerical Ability combination of scores is higher for persisters than for drop-outs. All three nominal groups can be distinguished by the combined Verbal Reasoning-Numerical Ability scores, whereas, no other single D.A.T. sub-test has this discriminative power.

Secondly, the differences and similarities of Lorge-Thorndike Test scores of graduates, persisters and drop-outs are considered. Hypothesis 5 is accepted based on the findings of this study. Hypotheses 4 and 6 are rejected. Graduates do obtain higher scores than drop-outs on both the Verbal and Nonverbal batteries of the Lorge-Thorndike Test. Findings indicate that graduates and persisters score the same on both test batteries. Persisters score higher than drop-outs on the Verbal battery of the Lorge-Thorndike Test.



Hypothesis 7 concerning demographic variables of graduates, persisters and drop-outs is inconclusive because of an insufficient number of persons in each sub-category.





## CHAPTER V

### DISCUSSION AND IMPLICATIONS

#### DISCUSSION

The purpose of this study was to examine aptitudinal, intellectual and demographic variables pertaining to Business Administration students at N.A.I.T. The procedure employed was to observe D.A.T., Lorge-Thorndike Test and demographic measures of graduates, persisters and drop-outs. Factors relevant in distinguishing the various nominal groupings were sought.

The results of the present study indicate that certain sub-tests of the D.A.T. and Lorge-Thorndike Test are effective predictors of academic success and failure. Nine predictors of these two tests which contribute in identifying graduates from drop-outs are: Verbal Reasoning, Verbal Reasoning plus Numerical Ability, Abstract Reasoning, Numerical Ability, Space Relations, Spelling, Grammar, Verbal battery and Nonverbal battery scores. The Verbal Reasoning and the combined Verbal Reasoning-Numerical Ability scores demonstrate ability in discerning the graduate group from the persister group. The combined Verbal Reasoning-Numerical Ability and Verbal battery scores of persisters were higher than drop-outs. It was further found that Verbal Reasoning plus Numerical Ability scores



constitute a measure that can effectively distinguish all three nominal groupings which would appear to make the D.A.T. a more effective discriminator than the Lorge-Thorndike Test in this study.

From the above information there would appear to be enough evidence to suggest that successful and unsuccessful Business Administration students can be identified on the basis of D.A.T. and Lorge-Thorndike scores.

## IMPLICATIONS

### Use in Counselling

Firstly, since both the D.A.T. and Lorge-Thorndike Test demonstrate some ability to differentiate successful from unsuccessful groups the counselling department at N.A.I.T. could reduce both costs and time in its group testing program, without losing effectiveness, by administering only one test. The D.A.T. would appear to be the better choice of test instrument as it contains nine possible predictors and appears, in this study, to be a good discriminator of success and failure.

Secondly, knowledge that certain sub-test scores can better identify successful and unsuccessful groups could help the N.A.I.T. counsellor give more effective D.A.T. and Lorge-Thorndike Test interpretations to both the prospective and the already registered Business Administration students.



### Use in Administration

The finding of this study indicate that a large number of students with high D.A.T. and Lorge-Thorndike Test scores do not graduate from the Business Administration program. It seems that factors other than academic ability are causing many students to withdraw from this program. Due to the high percentage of drop-outs, indicated in this study, it would appear essential that investigations be conducted to determine other problem sources which are causing student withdrawals.

### Possibilities for Research

A challenge for future research could be a replica of the present study. Additional variables could be observed such as personality, motivational or interest factors. Investigations of this kind could serve to identify other sources of variance not considered in the present study. The use of a much larger sample would enable the researcher to explore demographic variables not considered in this study.

Expanding research studies to include other N.A.I.T. technologies (approximately 50) could prove valuable in revealing pertinent information which could guide the educators of this Technical Institute in formulating future policies.

At the present time many educational institutions are attempting to institute greater accountability in



terms of manpower and money applications to educational practises. This investigation definitely has implications for obtaining a new level of accountability at N.A.I.T. Firstly, it appears possible to reduce the large number of drop-outs in the Business Administration program by being more selective when admitting students. Secondly, it seems feasible to effect economies in the group testing program by omitting one series of tests.





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